Remarks

1. New matter described in 2. a, b, c, d, e, k and m of the Office communication (hereinafter "communication") has been deleted.
2. New matter described in 2. f, i and l of the communication has been canceled by replacing the new matter with language from the original application.
3. New matter described in 2. g, h and j of the communication caused by the deletion of specific parts of the original specification has been canceled by reinserting the deleted parts into the specification.
4. New matter described in 2.m of the communication regarding "partial vacuum" has been replaced with "lower total pressure". Applicant respectfully submits that the replacement will not add new matter to the application because the replacement is based on the second to the last paragraph on page 7 of the specification as amended by Amendment A.
5. Applicant provided new arguments with this Amendment B and made all the necessary changes to the application required in the communication. Additional changes became necessary to overcome claim rejections under U.S.C. Sections 112 and 103. Corresponding reasons are provided with the changes.

Response to Claim Rejections – 35 U.S.C. Section 112

6. To comply with 9-10 of the communication, Applicant deleted the new matter from the application.
7. To comply with 11-13 of the communication, Applicant amended the claims. Applicant respectfully submits that the amended claims are clear, definite and

unconfusing.

8. To cover other embodiments of "cooling means" and "cleaning means", Applicant respectfully requests the addition of Claims 18, 19, and 20. The embodiments are described in the reinserted paragraphs after line 14 on page 6 of the specification.

Response to Claim Rejections – 35 U.S.C. Section 103

9. In response to 15 of the communication, Applicant provides the following:
(A) Applicant respectfully submits that the cylindrical shape used in Figure 2 of this application is just one of the many possible shapes that can be used in the present invention. As explained on page 6 of the specification the elements composing the dry scrubber/collector, a.k.a. Particulate Trapper, can be embodied in several ways, and for this reason the Particulate Trapper can have numerous embodiments. Another embodiment is shown in Figure 3 of this application. This latter embodiment shows water-cooled plates comprising said solid surface and a box-like enclosure. Applicant's purpose in presenting Figure 3 is to emphasize that there are other possible shapes that can be used for said solid surface and said enclosure. Being able to use different shapes improves the flexibility in applying the invention. For example when there is limited space available a more compact embodiment of the present invention can be used. One such embodiment is shown in Figure 3 where more solid surface, i.e., particulate and water condensate collection surface, can be used in a smaller enclosure.

Therefore, a cylindrical shape is not a requirement of the present invention. The cylindrical shape used in Figure 2 was simply to provide some specificity and to

help visualize the concept of sulfur compound and particulate removal in the Detailed Description of the Drawings of this application.

(B) Ashley et al. (US 4,530,822) disclose the collection of dry powder on page 4 lines 16-19 by:

"As the absorbent removes the sulphur dioxide from the gas, the water evaporates from the spray droplets, leaving a dry powder containing the sulphur dioxide, some of which powder readily separates from the gas for immediate collection."

and on page 8 lines 10-12 by:

"Spray drying occurs in tower 6 as described above upon contact of the hot gas and the atomized absorbent, and dry powder effluent is collected at the bottom of tower 6 and removed via a valve 6a."

The above disclosures did not explain the methodology used for collection of the powder, i.e., whether by gravity or by some other means.

If the inner wall temperature of tower 6 is equal or less than the dew point temperature of the gas, the possibility of which was explained on page 11 of the communication, condensation will occur on the inner wall. Suspended particles in the gas, such as dry powder, could adhere to the condensate on the inner wall.

The adherence of particles on the inner wall is not considered desirable by Ashley

et al. This is evidenced by the second paragraph from the bottom of page 8 which discloses:

"FIGS. 6, 7 and 8 show 106 a preferred modified form of the tower 6 designed with a view to optimizing uniform gas flow distribution in the tower and minimizing the risk of the spray pattern impinging on the wall of the tower, which can lead for example to uncontrolled solids build-up and incomplete evaporation."

Clearly, Ashley et al.do not want any water or adhesive material on the inner wall of the tower because it can lead to for example to uncontrolled solids build-up. It is in this particular issue where Ashley et al.and the present invention deviate regarding the criticality of the "dew point temperature of the gas". While Ashley et al.do not want water or adhesive material on the inner wall of the tower because of the possibility of uncontrolled solids build-up, the present invention wants water and adhesive material on said solid surface. The present invention wants water vapor to condense on said solid surface and for this reason requires that the temperature of said solid surface to not exceed the dew point temperature of the gas. A cleaning means is an element of the present invention for removing the solids build-up. The formation of deposits or solids build-up, as Ashley et al.call it, is in fact the very essence of the present invention.

Therefore, Ashley et al.do not appreciate the advantages of the present invention.

Up to now, those skilled in the prior art never appreciated the advantages of the present invention, although they are inherent.

Furthermore, in the last sentence of the second paragraph from the bottom on page 10, Ashley et al.advise:

"The evaporative cooling tower may be provided with a refractory lining (not shown) according to the temperatures likely to be encountered in use."

The use of refractory lining will thermally insulate the wall. The use of refractory lining will surely minimize or prevent condensation of water vapor on the inner wall and the potential formation of the uncontrolled solids build-up mentioned earlier.

Again, it is evident that the advantages of the present invention are not appreciated by Ashley et al.

If the present invention was in fact obvious, because of its advantages, those skilled in the art surely would have implemented it by now.

(C) Step (a) of Claim 10 has been amended by replacing "a mixture" with "separately controlled functional amounts" and by deleting "while separately controlling the components of said mixture".

On page 5 of the amended Specification, two paragraphs near the bottom of the page describe the functions of said water supply flow control means and said chemical reagent supply flow control means. To perform those functions, the two control means must be able to quickly respond to any changes of their respective process parameter, in the case of said water supply flow control means to for example the

relative humidity of the gas to ensure the gas will not be supersaturated and in the case of said chemical reagent supply flow control means to for example to the rate of flow of the fuel with known sulfur content. Applicant used the simple modifier "functional " to define that the amount delivered by a control means is based on its respective function.

(D) Step (b) of Claim 10 has been amended by replacing "does not exceed" with "is kept from exceeding" and by adding "by heat transfer to an external cooling means" after "gas". The amendment will clearly define that heat transfer to cool said solid surface in order to ensure that the temperature of said solid surface will not exceed the dew point temperature of the gas is to an external cooling means. The amended step (b) of Claim 10 should avoid any confusion regarding the manner of cooling of said solid surface. The amended Claim 14 defines heat transfer to a plurality of air-cooled cooling fins, Claim 18 defines heat transfer to a water jacket and Claim 19 defines heat transfer to a refrigerant.

9. In response to 16 of the communication, Applicant provides the following:

GB 2 014 975 (hereinafter"GB '975") discloses the following:

on page 1 lines 1-3:

"More particularly, in accordance with the present invention it is possible to obtain satisfactory absorbent utilization employing either sodium alkali or calcium alkali absorbents, while concurrently removing in excess of 90% of the sulfur oxides

contained in the hot gas."

on page 1 lines 13-19:

"The preferred sodium alkali absorbents are sodium carbonate, sodium hydroxide and mixtures thereof. Particularly preferred for commercial use are soda ash and trona. The preferred calcium alkali absorbents are calcium oxide and calcium hydroxide, slaked lime being particularly preferred. The selected absorbent is dissolved or dispersed in an aqueous medium, depending on its solubility, and is then controllably introduced into the spray dryer, together with the hot gas, in an amount at a rate to react with only a portion of the sulfur oxides present in the hot gas to produce a dry particulate reaction product."

and on page 6 lines 28-31:

"Referring now to the drawing, a selected absorbent is discharged from a hopper 10 into a mixing vessel 12 which is provided with a suitable stirring means such as a motor driven propeller-mixer 14. Water is introduced in the mixing vessel 12 via a conduit 16. The water and absorbent are mixed to form an aqueous medium containing the absorbent in solution or as a slurry."

Based on the above disclosures, it can be concluded that GB '975 employs a batch process for preparing the mixture of chemical reagent and water wherein separately controlled amounts of the selected absorbent, i.e., the chemical reagent, and water are introduced into a mixing vessel provided with suitable stirring means. The

aqueous mixture is then controllably introduced into the spray dryer.

In a batch process, the proportion or ratio of the amount of chemical reagent to the amount of water is fixed after the mixture is formed. If the introduction rate of the aqueous mixture is controlled as a function of the amount of sulfur oxides in the gas, meaning the chemical reagent supply control will deliver the functional amount for the control of sulfur oxides , then the amount of water introduced with the aqueous mixture to control for example the relative humidity of the gas may not necessarily be the functional amount required to control relative humidity. Conversely, if the introduction rate of the aqueous mixture is controlled to deliver the required functional amount of water to control the relative humidity of the gas, the amount of chemical reagent introduced by the aqueous mixture may not necessarily be the functional amount required to control sulfur oxides. Hence, only one of the two controls of GB '975 can be expected to deliver a required functional amount under all conditions of the hot gas.

Said water supply flow control means and said chemical reagent supply flow control means of the present invention will deliver their respective functional amounts under all conditions of the gas. Only one of the two controls of GB '975 can be expected to deliver the required functional amount under all conditions of the gas. If Ashley et al. have separate controls as GB '975, then the conclusion regarding the lack of simultaneous functionality will also apply.

Therefore, Ashley et al.and GB '975 did not make the present invention obvious.

Comments on Response to Arguments

10.Applicants arguments filed November 24, 2004 have not been found persuasive. Applicant respectfully provides the following comments (numbers and letters paralleling those in the remarks filed November 24, 2004) regarding the response to the arguments:

9.(A) At this time, Applicant will not pursue Unexpected Results and Solution of a Long-Felt Need to support unobviousness of the present invention.

9.(B) At this time, Applicant will not pursue elimination or omission of an element of the prior art to support unobviousness of the present invention.

9.(C) See 9. of the remarks with this Amendment B.

9.(D) "means" has been deleted from amended Claim 11.

9.(F) "cleaning means" has been deleted from amended Claim 15.

9.(G) See 9. of the remarks with this Amendment B.

9.(H) The following is a very important fact which was not emphasized in the remarks filed November 24, 2004 regarding "the use of an amount of water which will not cause the gas to be supersaturated":

In Ashley et al., "maintaining unsaturation of the gas" is at the stack after the gas has exited the spray tower, while in the present invention "maintaining unsaturation of the gas" is at the entrance of the dry scrubber/collector after chemical reagent and water have been sprayed into the gas and before the gas comes in contact with said solid surface. The water flow controller of the present invention will control the amount of water to ensure the gas will not be supersaturated.

Hence, the locations where the gas is to be unsaturated are different. Ashley et al., therefore, did not anticipate the present invention and did not make the present invention obvious.

10.(A) "concurrently" has been deleted from Claim 10.

10.(B) See 9. of the remarks with this Amendment B.

10.(C) "means" has been deleted from Claim 14.

12.See comments in 9.(A) and 9.(B) above.

13.-14. See comments in 9.(A) and 9.(B) above.

15.-16. See comments in 9.(A) and 9.(B) above.

17.-18. The claims have been amended. Also, please see 9.(B) of the remarks with this Amendment B.

Request for Constructive Assistance

10.The undersigned is very grateful for the constructive comments and suggestions by the Examiner. Diligent effort has been made to amend the claims of this application to put them in a condition that is respectfully submitted to be suitable for allowance. If for any reason, the claims are not believed to be in full condition for allowance, Applicant respectfully requests the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims pursuant to MPEP 707.07(j) or in making constructive suggestions pursuant to MPEP 706.03(d) in order that this application can be placed in allowable condition as soon as possible without the need for further proceedings.

Very respectfully,

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